



## **Sensory Disorders and Loss Solicitation**

### **1. Purpose**

This announcement by the Health Services Research and Development Service invites VA investigators to submit proposals for research on sensory disorders and loss. Designated research funds are available to support health services research focused on improving the capacity of the VHA to address sensory loss common in veterans. The proposed studies are expected to produce new knowledge for improving the effectiveness and cost effectiveness of care delivery for patients with sensory disorders by drawing on the perspectives and experience of diverse disciplines and professions.

### **2. Eligibility**

Investigators who hold a paid VA appointment of at least 5/8 time are eligible to apply. Any questions about eligibility may be referred to the HSR&D Eligibility Coordinator (see below).

### **3. Background**

Humans rely on sensory perceptions to interact with and interpret their surrounding environment. Loss or impairment of a sense, such as sight or hearing, can be a traumatic event, causing mental and emotional anguish. Decreased vision and/or hearing acuity interferes with reception of the spoken message and as a result people with sensory loss frequently experience communication breakdown. Older adults with sensory loss often experience difficulty adjusting to their sensory loss; depression, anxiety, lethargy and social dissatisfaction are often reported (Heine and Browning, 2002).

Sensory loss is common in veterans. The loss may be the result of traumatic injury or military exposure, the result of a progressive disease process, secondary to acute or chronic disease, or normal aging. Sensory loss includes irreversible sensory deficits of the types listed below, as well as services and devices to moderate them:

- Hearing disorders
- Vision disorders
- Disorders of taste and smell
- Dual sensory disorders
- Sensory deficits secondary to neurological disorders, and
- Sensory deficits secondary to aging

#### **Hearing Loss**

Hearing loss is the third most prevalent chronic condition in older adults. About 28 million people in the U.S. have some degree of reduced hearing sensitivity. Between 25% and 40% of the population over 65 is hearing-impaired (Gates et al., 1990; U.S. Department of Commerce,

1997; Cruickshanks et al., 1998; Rueben et al., 1998). The prevalence rises with age, ranging from 40% to 66% in patients over 75 (Rahko et al., 1985; Parving & Philip, 1991; Ciurlia-Guy et al., 1993) and over 80% in patients over 85 (Gates et al., 1990). Rates are higher in men; over 40% of men in the Framingham cohort aged 65-70 reported hearing impairment, and this proportion rises further with age (Gates et al., 1990).

Given the strong evidence supporting the association between hearing loss and noise exposure (Taylor et al., 1965) and, in particular, acoustic trauma from the firing of weapons (Henderson and Hamernik, 1986; Price et al., 1989), and that most veterans are men, it is not surprising to expect that the prevalence of hearing loss in veterans is higher than in the general population. The Department of Veterans Affairs' Office of Policy and Planning estimates that nearly 300,000 veterans have service-connected hearing loss. The actual number of hearing impaired veterans is likely much higher, because many veterans have hearing loss that is not service-connected, and because hearing loss is generally under-diagnosed. In 1999, 85,000 veterans were fitted for hearing aids at VA medical centers (Impacts 2001).

Hearing loss is detrimental to communication not only in the obvious ways, but is also strongly associated with depression, social isolation, poor self-esteem, functional disability, and dementia (Kay et al., 1964; Herbst & Humphrey, 1980; Mulrow et al., 1990; Laforge et al., 1992; Carabellese et al., 1993; Appollonio et al., 1996; Gurland, 1977). Despite the prevalence and burden of hearing loss, it is likely that hearing impairment is under-diagnosed: only 9% of internists offer hearing testing to patients 65 and older (U.S. Department of Health and Human Services, 1997) and under-treated: only 25% of patients who could benefit from wearing a hearing aid receive one (Gates et al., 1990; Kochkin, 1997). For veterans, under-treatment is likely even worse since nearly 25% of veterans who are eligible for audiology services and who have considered getting hearing aids report that they have not because they were unaware of this VA benefit.

The under-detection and under-treatment of hearing loss is unfortunate, because there is strong evidence that treatment of hearing loss improves quality of life (Mulrow et al., 1990; Mulrow et al., 1992; Jerger et al., 1996; Yueh et al., 2001).

However, treatment effectiveness is not guaranteed even if patients receive hearing aids. Non-adherence to hearing aids is notoriously high. Several authors have conservatively estimated that up to 30% of patients who receive hearing aids do not use their aids (Gates et al., 1990; Ovegard & Ramstrom, 1994; Popelka et al., 1998; Kochkin, 2000). Given the prevalence and disease burden of undetected hearing impairment in older persons, and the availability of effective treatments, it is important for primary care providers to screen, recognize, manage and appropriately refer patients with hearing impairment and that eligible veterans are educated about their hearing aid benefits.

### Visual Impairment

Approximately 1.7 million people may become visually impaired with age-related macular degeneration and diabetic retinopathy, which affect from 12,000 to 24,000 people each year (NIH, 1993). The "baby-boomer" generation is rapidly moving through middle age and entering older age, so the number of severely visually impaired older persons is expected to increase. The number of individuals with visual impairment rises sharply in the over-65 years-of-age group; the majority (68%) of all severe visual impairments occur in this age group (Nelson & Dimitrova, 1993).

The National Eye Institute reports that billions of dollars are lost each year due to visual impairments (NIH, 1993). The spiraling costs, increasing numbers of patients, changing demographic patterns, and rising expectations regarding one's quality of life are issues that vision rehabilitation professionals are facing in the twenty-first century.

Severe visual impairment is also life threatening for the elderly. Having either a vision or hearing impairment places the individual at increased risk for mortality, as great as 2.5 times the risk for a person of comparable age who is not visually impaired (Thompson, Du, and Rosenthal, 1989; Ford, et al., 1988; Chamove and Young, 1989). The studies that have examined individuals having impairments to both vision and hearing indicate that for elderly individuals, dual sensory impairments may present more of a risk for mortality than is the case with either impairment alone (LaForge, Spector, & Sternberg, 1992; Appollonio, et al., 1995).

Researchers and clinicians in the field of visual impairment have long recognized the need for standardized outcome measures, and greater knowledge of the effects of variations in practice styles among providers and institutions, and patient population characteristics (Stryer, Tunis, Hubbard, and Clancy, 2000; Lidoff, 1997; Goodrich, 1998). However, before researchers can begin to compare the practice patterns of VA and non-VA Blind Rehabilitation Centers, the field must have standardized outcome measures with which they can begin to profile the patient population and establish a “gold standard” that can be used to benchmark outcomes.

The need for low vision and blind rehabilitation in VA is crucial since the veteran population averages some 10 to 15 years older than the non-veteran U.S. population (National Center for Veteran Analysis and Statistics, 1995). Their age, coupled with the age-related nature of severe visual impairment, may show peak rates of vision loss a decade earlier than the non-veteran population. As a result, vision rehabilitation research strategies and outcome assessments currently under development in VA have the potential to be models for non-veteran agencies as they prepare to respond to the dramatic increase in severe visual impairment likely to occur over the next decade.

### Disorders of Taste and Smell

Over 2 million adult Americans have disorders of taste and smell. The prevalence of these disorders is higher than thought; a National Geographic Society study documented a 1.2% permanent and 62.4% temporary loss in ability to smell among 1.5 million participants. The causes of taste and smell disorders are diverse, involving over 200 medical conditions and numerous medications.

The most common causes of olfactory disorders are rhinosinusitis and persistent loss after upper respiratory infection, which are extremely common in the U.S. population. Other common causes of olfactory loss, such as aging, exposure to toxins, and head trauma, are particularly relevant to the veteran population. Head trauma is the third most common cause of olfactory disorders, accounting for 15% of permanent loss. In addition, aging, exposure to toxins, and medications are also contributory (Leopold, 1998).

## **4. Scope of HSR&D Research Interests**

Proposed studies should address the outcomes of sensory disorders services that aim to optimize patient physical functioning, independence, and quality of life. The underlying clinical condition may be selected from the broad range of problems common among veterans, including traumatic accidents, environmental exposures, military exposure, injury, and disease

resulting in sensory impairment. Studies may address the outcomes of services designed to restore or compensate losses in sensory function. These include the services provided by all pertinent VA health care professionals, especially rehabilitation specialist physicians, other physicians, nurses, psychologists, social workers, audiologists, speech-language pathologists, opticians, and other allied health personnel (and non-VA providers, as comparisons).

## **Outcomes of Interest**

Proposed studies should focus on the outcomes of VA sensory disorders services. Pertinent outcomes fall into two major categories (System- and Patient-level).

**System-Level Topics.** Studies that will help explain and guide improvements in the design, administration, and/or management of sensory impairment services. This includes system-level outcomes, especially quality of care, cost, access to needed services, and efficient provision of aids for sensory impairment.

**Patient-Level Topics.** Studies that will help explain the outcomes that most directly concern patients and their families. In general terms, these include functional status, independence, health status, symptoms and symptom management strategies, prognosis, quality of life, and satisfaction with care. More specifically, patient level outcomes may include hearing, speech, vision, orientation, smell, taste, ambulation, mobility, and other functions that affect independence, productivity, and quality of life. Studies might also include aspects of caregiver and family assistance and burden involved with maintaining patients with sensory deficits in independent living situations. Studies focused on evaluating devices and technologies (e.g., durability of prostheses) are not responsive to this solicitation; however, studies focused on increasing use of aids provided to patients can be considered.

## **5. Sample Research Issues**

In developing research projects responsive to this announcement, investigators should be familiar with the pertinent literature, and they should consider ways to build on the work currently supported by HSR&D. To search for active HSR&D projects, visit <http://www.hsrd.research.va.gov/> and search the Progress Reports.

The following examples are provided for purposes of illustration.

a. Research on sensory impairment outcomes requires valid and reliable measures for a variety of complex variables. In cases where good measures do not already exist, HSR&D is interested in supporting projects to develop them. *NOTE: Investigators need to provide a detailed explanation of how the proposed measure differs from any existing measures.* Possibilities include:

- Measures of patient outcomes for specific sensory impairments or for common constellations of problems that call for the use of healthcare services. Outcomes for which new measures may be needed include measures of health status, functional status, and independence for persons with sensory impairments who are receiving VA sensory disorder services. Both subjective and objective measures of outcomes are appropriate.
- Measures and instruments for assessing patient factors that influence the outcomes of healthcare services, especially patient perceptions and values related to their

condition and its treatment or management, patient decision making, and behavior. For example, measures or instruments to assess patients' treatment goals and preferences, patient satisfaction, or compliance with prescribed regimens related to treatment and rehabilitation, or to screen/identify patients who are likely to benefit from sensory disorder services.

- Case mix measures to address the severity of problems and/or the combination of disabilities and impairments in the study population (e.g., multiple sensory disabilities, motor plus sensory impairments, permanent sensory impairment plus acute illness, permanent sensory impairment plus chronic illness, sensory impairment plus depression or substance abuse).

b. Research on the prevalence and incidence of sensory impairment as well as dual sensory impairment in VA population.

c. Comparisons of the efficacy and effectiveness of competing models for sensory disorders in patient treatment.

d. When credible measures of appropriate outcomes are available, research responsive to this solicitation should address the relationships between the organization and delivery of rehabilitation services and the resulting outcomes. Illustrative research questions include:

- What outcomes are realistic (as patient goals or for use as indicators of the quality of care) for services associated with sensory disorders? For example, what is the likelihood of improvement, sustainability of benefit, risk of secondary disability or deteriorated function due to re-injury, infection, acute or chronic disease, noncompliance, and aging?
- What specific aspects of sensory disorder services contribute most to the achievement of optimal outcomes?
- How are outcomes affected by recent changes in the organization of the Veterans Health Administration (VHA) services, especially movement toward more managed care and more primary care?
- How do aspects of the delivery of services (e.g., the kinds and combinations of providers involved, inpatient versus outpatient, and intensity of therapy) affect key patient and system level outcomes?
- How do the outcomes of VA services compare across VA facilities, and how do they compare with non-VA services? What lessons might be learned from diverse models for the organization or delivery of care?
- What intervening factors (patient factors such as aging, comorbidities, communications disorders, and system factors such as availability of home care, geographic location of services) inhibit or serve as barriers to achieving optimal outcomes?
- Are any groups of veterans at particular risk or disadvantage in terms of good outcomes? If so, how can this risk be reduced?

- What is the access to care that veterans have to sensory services? For example, does service connection rating have association with noise exposure sustained during active duty? How many veterans with sensory disorders are forced to seek care outside VA?

e. Another appropriate area of investigation responsive to this solicitation addresses the interrelationships between general health care and sensory disorders care. Some sample questions include:

- What are the interrelationships of the outcomes of sensory disorders services and the outcomes of other kinds of health care services? Are general health care outcomes (including mental health outcomes) equivalent for veterans who need sensory disorders services and veterans who do not?
- What factors facilitate or impede optimal health promotion among various groups of veterans with sensory disorders?

f. Another area of investigation responsive to this solicitation addresses the qualitative aspects of managing sensory deficits as a chronic condition defining qualitative aspects of well being, caregiving burden, and barriers to obtaining needed services and assistive devices. Sample questions include:

- What are the outcomes issues and concerns (psychosocial, symptom relief, or other quality of life issues) that patients identify as important? How do patients manage sensory deficits while maintaining independence in their daily lives? What is the subjective impact of sensory deficits in the lives of patients living independently in the community? What health care resources are needed to support their independence?
- What are the caregiver burdens imposed on family members due to sensory deficits and how are these managed in the home? What health care services do caregivers identify that would assist them in supporting sensory impaired patients to continue living independently?
- What are patients' expectations and preferences for treatment and how do they differ from health care professionals? If they differ, how might these differences be addressed?
- Are there gaps in patient and caregiver knowledge and understanding about their sensory deficits, assistive devices and management strategies that can be addressed by the health care system?

## **6. Funds Available**

HSR&D has dedicated a total of \$3 million for this solicitation and plans to initiate the first new projects in the third quarter of FY 2004. Because the nature and scope of the proposed research will vary from application to application, it is anticipated that the size and duration of each award will vary. Awards pursuant to this solicitation are contingent upon the availability of funds and the receipt of a sufficient number of meritorious applications.

## **7. Letter of Intent**

These solicitations follow established procedures for HSR&D's Investigator-Initiated Research program. All applicants must first submit a Letter of Intent (LOI) in the format specified in VHA Handbook 1204.01 Chapter 2, "Letters of Intent and Concept Papers" (available at all VA Research and Development (R&D) offices and on the VA research home page at <http://www.va.gov/resdev>). LOIs will be reviewed for relevance to both this announcement and VA HSR&D and for scientific merit. LOIs responding to this announcement will be reviewed monthly along with other LOIs submitted to HSR&D. Letters received by the last business day of a month will be reviewed the following month.

## **8. Proposal Preparation and Submission**

Applicants with an approved LOI will be invited to submit a full research proposal. Proposals are to be prepared in accordance with VHA Handbook 1201.01 Chapter 3, "Project Proposals" (available at all R&D offices and on the web at <http://www.va.gov/resdev>). The initial proposal receipt date is November 1, 2003. Proposals will continue to be accepted each November 1 and May 1 until further notice. No individual may be named as Principal Investigator (PI) or co-PI on more than one proposal per solicitation topic per review cycle, in response to this announcement.

## **9. Research Methods**

All proposed studies are expected to use research designs and methods that maximize the validity, reliability, generalizability and usefulness of findings. While the research must be grounded in the realities of VA practice and address real world information needs, it also must have a clear theoretical framework, demonstrate familiarity with the pertinent literature, and employ a data collection and analysis strategy that will yield valid, useful conclusions. The multidisciplinary nature of health services research should be evident in the formulation of the research questions, and the methodological approach may draw from one or more discipline(s). Study teams should generally include individuals with experience and expertise in clinical and non-clinical fields, including pertinent social scientists and research methodologists.

## **10. Review**

Proposals received in response to this announcement will undergo merit review, along with other IIR projects, by the HSR&D Scientific Review and Evaluation Board (SREB). The review is rigorous and standards are very high; both scientific merit and expected contribution to improving VA health services are considered. Investigators are expected to develop and describe their research plan completely and in detail. Proposals recommended for approval by the SREB will be considered for funding.

## **11. Inquiries**

For general information regarding this announcement or the review of applications, contact Martha Bryan, EdD, HSR&D Assistant Director at (202) 254-0251 or [martha.bryan@hq.med.va.gov](mailto:martha.bryan@hq.med.va.gov). To inquire about eligibility, contact Caryn Cohen, MS, HSR&D Eligibility Coordinator, at (202) 254-0218 or [caryn.cohen@hq.med.va.gov](mailto:caryn.cohen@hq.med.va.gov).

Nelda Wray, MD  
Chief Research and Development Officer



## References

- Appollonio, I., et al. (1995). Sensory impairments and mortality in an elderly community population: A six-year follow-up study. *Age and Aging*, 24(1), 30-6.
- Appollonio I, Carabellese C, Frattola L, Trabucchi M. Effects of sensory aids on the quality of life and mortality of elderly people: a multivariate analysis. *Age & Ageing*. 1996;25(2):89-96.
- Carabellese C, Appollonio I, Rozzini R, et al. Sensory impairment and quality of life in a community elderly population. *J Am Geriatr Soc*. 1993;41(4):401-407.
- Chamove, A. & Young, M. (1989). Surveillance evaluation for the elderly. *Health Visit*, 62, 301-2.
- Ciurlia-Guy E, Cashman M, Lewsen B. Identifying hearing loss and hearing handicap among chronic care elderly people. *Gerontologist*. 1993;33(5):644-649.
- Cruickshanks KJ, Wiley TL, Tweed TS, et al. Prevalence of hearing loss in older adults in Beaver Dam, Wisconsin. The Epidemiology of Hearing Loss Study. *Am J Epidemiol*. 1998;148(9):879-886.
- Dargent-Molina, P., et al. (1996). Fall-related factors and risk of hip fracture: The EPIDOS prospective study. *The Lancet*, 348, 145-149.
- Ford, A., et al. (1988). Health and function in the old and very old. *Journal of the American Geriatric Society*, 36, 187-97.
- Gates GA, Cooper JC, Jr., Kannel WB, Miller NJ. Hearing in the elderly: the Framingham cohort, 1983-1985. Part I. Basic audiometric test results. *Ear Hear*. 1990;11(4):247-256.
- Goodrich, G.L. & Ludt, R. (2000). Quantifying visual detection distances. In *International Mobility Conference 11*. University of Warwick, England: Guide Dogs for the Blind Association.
- Gurland BJ, Kuriansky JB, Sharpe L, Simon R, Stiller P, Birkett P. The comprehensive assessment and referral evaluation (CARE)--rationale, development, and reliability. *Int J Aging Hum Dev*. 1977;8:9-42.
- Heine, C & Browning, C.J. (2002). Communication and psychosocial consequences of sensory loss in older adults: overview and rehabilitation directions. *Disability & Rehabilitation*, 24(15), **763-774**.
- Henderson, D. and R. P. Hamernik (1986). "Impulse noise: critical review." *J Acoust Soc Am* 80(3): 569.
- Herbst KG, Humphrey C. Hearing impairment and mental state in the elderly living at home. *Br Med J*. 1980;281(6245):903-905.

Jerger J, Chmiel R, Florin E, Pirozzolo F, Wilson N. Comparison of conventional amplification and an assistive listening device in elderly persons. *Ear Hear.* 1996;17(6):490-504.

Kay DW, Roth M, Beamish P. Old Age Mental Disorders in Newcastle upon Tyne. II. A study of possible social and medical causes. *Br J Psych.* 1964;110:668-682.

Kochkin S. MarkeTrak IV: What is the Viable Market for Hearing Aids? *Hearing J.* 1997;50(1):31-39.

Kozel, B. (1995). Diabetes and orientation and mobility training: An added challenge. *Journal of Visual Impairment and Blindness*, 89(4), 337-42.

LaForge, R.G., Spector, W.D. & Sternberg, J. (1992). The relationship of vision and hearing impairment to one-year mortality and functional decline. *Journal of Aging and Health*, 4, 126-48.  
Leonard, R. (2001). *Statistics on vision impairment: A resource manual*. New York: Arlene R. Gordon Research Institute, The Lighthouse Inc. 41.

Leopold, D. Physiology of olfaction (Chapter 41). In otolaryngology—heas and nuck surgery, 3<sup>rd</sup> ed. (editor, Cummings, C.W.). St. Louis: C.V. Mosby Company, 1998.

Massof, R. W. (2002). A model of the prevalence and incidence of low vision and blindness among adults in the U.S. (2002). *Optometry and Vision Science*, 79(1), 31-36.

Mulrow CD, Aguilar C, Endicott JE, et al. Association between hearing impairment and the quality of life of elderly individuals. *J Am Geriatr Soc.* 1990;38(1):45-50.

Mulrow CD, Aguilar C, Endicott JE, et al. Quality-of-life changes and hearing impairment. A randomized trial. *Ann Int Med.* 1990;113(3):188-194.

Mulrow CD, Tuley MR, Aguilar C. Sustained benefits of hearing aids. *J Speech Hear Res.* 1992;35(6):1402-1405.

National Center for Veteran Analysis and Statistics. (1995). *National Survey of Veterans*. Washington, D.C.: U.S. Government Printing Office, No. P92943.

National Center for Health Statistics, *Vital Health Statistics*, 10 (199)

Nelson K.A. & Dimitrova E. (1993). Severe visual impairment in the United States and each state. *Journal of Visual Impairment and Blindness*, 87, 80-85.

Ovegard A, Ramstrom AB. Individual follow-up of hearing aid fitting. *Scand Audiol.* 1994;23(1):57-63.

Parving A, Philip B. Use and benefit of hearing aids in the tenth decade and beyond. *Audiol.* 1991 1991;30:61-69.

Popelka MM, Cruickshanks KJ, Wiley TL, Tweed TS, Klein BE, Klein R. Low prevalence of hearing aid use among older adults with hearing loss: the epidemiology of hearing loss study. *J Am Geriatr Soc.* 1998;46:1075-1078.

Price, G. R., H. N. Kim, et al. (1989). "Hazard from weapons impulses: histological and electrophysiological evidence." J Acoust Soc Am 85(3): 1245.

Pukkala, E., et al.. (1999). Visual impairment and cancer: A population-based cohort study in Finland. *Cancer Causes and Control*, 10,13-20.

Rees, T.S., Duckert, L.G., and Carey, J.P.; "Auditory and Vestibular Dysfunction" Principles of Geriatric Medicine and Gerontology, 4<sup>th</sup> edition, Ed. Hazzard et al, 1999.

Rahko T, Kallio V, Kataja M, Fagerstrom K, Karma P. Prevalence of handicapping hearing loss in an aging population. *Ann Otol Rhinol Laryngol*. 1985;94(2 Pt 1):140-144.

Rueben D, Walsh K, Moore A, al e. Hearing loss in community-dwelling older persons: national prevalence data and identification using simple questions. *J Am Geriart Soc*. 1998 1998;46:1008-1011.

Taylor, W., J. Pearson, et al. (1965). "Study of noise and hearing in jute weaving." *J Acoust Soc Am* 38: 113.

Thompson, J.R., L. Du, and A.R. Rosenthal. (1989). Recent trends in the registration of blindness and partial sight in Leicestershire. *British Journal of Ophthalmology*, 73, 95-99.

U.S. Department of Commerce. *Statistical Abstract of the United States*. 117th edition ed. Washington, D.C.; 1997.

U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health. Measuring the Quality of Life of People with Visual Impairment, Proceedings of a Workshop, September 13-14,1993, Author.

Weiffenback, J.M., Bartoshuk, L.M. Taste and Smell. Clinical Geriatric Medicine., 1992, \* (3): 543-55.

Yueh B, Souza P, McDowell, J, et al. Randomized trial of amplification strategies. *Arch Otolarygol Head Neck Surg*. 2001;127:1197-1204.